SECTION 8

INTERNAL QUALITY CONTROL CHECKS

8.1 Field Quality Control Checks

QC procedures for pH, Eh, specific conductance, temperature and turbidity measurements of water samples will include calibrating the instruments as described in Section 6.0 of the QAPP, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. The QC information for field equipment is stated in section 3.0 of this QAPP. The thermometer used will be compared to a NIST traceable thermometer (or equivalent). Soil color checks, if required, will be done using Munsell color charts. Assessment of field sampling precision and bias will be made by collecting field duplicates and field blanks for laboratory analysis. Collection of the samples will be in accordance with the applicable procedures in section **[Section Number]** of the Field Sampling Plan (FSP) at the frequency indicated in [the Appendix to this Model QAPP].

8.2 Laboratory Quality Control Checks

The laboratory identified in Section 7 of this QAPP has a QC program it uses to ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures are documented in writing as SOPs and each SOP includes a QC section which addresses the minimum QC requirements for the procedure. The internal quality control checks might differ slightly for each individual procedure but in general the QC requirements include the following:

- Field/Trip blanks
- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Analytical spikes (Graphite furnace)
- Field duplicates
- Laboratory duplicates
- Laboratory control standards

- Internal standard areas for GC/MS analysis: control limits
- Mass tuning for GC/MS analysis
- Endrin/DDT degradation checks for GC/EC analysis
- Second, dissimilar column confirmation for GC/EC analysis

For a description of the specific QC requirements of this facility investigation and the frequency of audit, refer to the submitted SOPs. The QC criteria are also included in the SOPs.

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory, if sufficient volume is available. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

QAPP ELEMENT 11

DATA REDUCTION, VALIDATION, AND REPORTING

The project plans for reducing data, validating data, and reporting data, for both field and laboratory activities will be explained in this section of the QAPP. Data reduction is the process of converting raw analytical data to final results in proper reporting units. In most cases, data reduction will be primarily concerned with the equation used to calibrate results. Data validation is the process of qualifying analytical/measurement data on the performance of the field and laboratory quality control measures incorporated into the sampling and analysis procedures. Data reporting is the detailed description of the data deliverables used to completely document the analysis, calibration, quality control measures and calculations. Individuals responsible for implementing data reduction, validation, and reporting for the project will be identified in this section of the QAPP.

For field activities, data reduction, validation, and reporting must be tailored to the nature of the instrumentation being utilized. For direct reading instruments, (e.g. pH meters, thermometers), where no calculations are involved, there will ordinarily be no data reduction. Therefore, the QAPP may simply state that there is no calculation involved. In order to address data validation for direct reading instruments, it must be ensured that transcription errors have not occurred as data are copied from log books to results forms. Also, there should be review of field logs to ensure that calibration was done as defined in the SOP. Field data are usually reported through report summary sheets tabulating results and field logbooks which document calibrations.

However, for field analytical instruments where data reduction may be necessary, such as in the case of a field gas chromatograph, the level of information concerning data reduction, validation, and reporting must be comparable to that required for laboratory instrumentation, as discussed below.

For laboratory activities, the following items must be addressed in this section:

A. DATA REDUCTION

1. Analytical procedures will contain the equation(s) used to calculate results. It may be acceptable to reference applicable section(s) of analytical SOPs where equations may be found.

2. Reduction procedures (as well as analytical procedures) must include the equations applicable for each matrix to be analyzed.

B. DATA VALIDATION

1. Sampling and analysis procedures must be complete to prepare and review a validation procedure.

2. Validation procedure must specify the verification process of every quality control measure used in the field and laboratory.

3. A 100% laboratory data validation must be performed by an entity independent of the laboratory, (i.e., engineering firm or laboratory's corporate QA officer).

4. A validation procedure should be prepared for each analytical procedure.

5. The U.S. EPA Functional Guidelines are only directly applicable to Contract Laboratory

Program Statements of Work, CLP-SOWs, low/medium analyses. For SW846 and other analytical methods, this guidance document can be used to construct the validation procedures for these methods.

6. All qualifiers used in the validation report as well as the contents of the validation report must be defined.

7. As outlined below, a "CLP-like" data deliverables package documenting analyses is necessary for a complete validation.

C. DATA REPORTING

1. Data deliverables should completely document the analysis (i.e. recreate the analysis on paper).

2. Data deliverables should be based upon the method.

3. The QAPP should provide a listing of data deliverables and examples of forms that will be used to tabulate the information. An example of a data deliverables package is found in the CLP-SOWs, exhibits B and C.

4. CLP-SOW deliverables are only directly applicable to CLP-SOW analyses. All other analyses require listing/examples.

5. Data deliverables are necessary for complete data validation.

6. Hardcopy data deliverables should be generated at the time of analysis and not "available upon request". At a minimum, one complete "CLP-like" data package (for all samples) must be delivered to the facility, to be made available to the U.S. EPA immediately upon request.

7. Typical data deliverables typically include, (but are not necessarily limited to):

   i. case narrative
   ii. calibration (initial/continuing) summary and raw data
   iii. mass spectrometer tuning data
   iv. gas chromatograms
   v. mass spectra
   vi. quality control summary forms and raw data
   vii. ICP, AA and graphite furnace data outputs
   viii. interelement correction data
   ix. blank data results
   x. method and instrumental detection limit results

An example of a section addressing this QAPP element is presented in the following example.

SECTION 9

DATA REDUCTION, VALIDATION, AND REPORTING

All data generated through in field activities, or by the laboratory operation shall be reduced, and validated prior to reporting. No data shall be disseminated by the laboratory until it has been subjected to these procedures which are summarized in subsections below:

9.1 Data Reduction

9.1.1 Field data reduction procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct read instrumentation will be employed in the field. The use of pH meters, thermometers, an OVA, and a probe to measure specific conductance will generate some measurements directly read from the meters following calibration per manufacturer's recommendations as outlined in section 6 of this QAPP. Such data will be written into field log books immediately after measurements are taken. If errors are made, results will be legibly crossed out, initialed and dated by the field member, and corrected in a space adjacent to the original (erroneous) entry. Later, when the results forms required for this study are being filled out, the Field Manager, identified in Section 2 of this QAPP, will proof the forms to determine whether any transcription errors have been made by the field crew.

Because the use of field instrumentation such as a mobile gas chromatograph will not be used until a later phase of the study has been reached, there will be no further need for assuring that field data has been reduced properly through the use of formulas or interpretation of raw data printouts. Later, when the Corrective Measures Implementation phase has begun, this QAPP will be modified to incorporate the use of the field gas chromatograph and any associated field data reduction procedures which may be relevant.

9.1.2 Laboratory data reduction procedures

Laboratory data reduction procedures will be followed according to the following protocol. All raw analytical data will be recorded in numerically identified laboratory

notebooks. These notebooks will be issued only by the Laboratory QA Manager. Data are recorded in this notebook along with other pertinent information, such as the sample identification number and the sample tag number. Other details will also be recorded in the lab notebook, such as the analytical method used (SOP#), name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings, and the raw data. Each page of the notebook shall be signed and dated by the analyst. Copies of any strip chart printouts (such as gas chromatograms) will be maintained on file. Periodic review of these notebooks by the Lab QA Manager takes place prior to final data reporting. (Records of notebook entry inspections are maintained by the Lab QA Manager.)

For this project, the equations that will be employed in reducing data are those associated with the CLP-SOW (Multi-Media, Multi-Concentration Contractural Requirements and Equations For Volatile Data Review OLM01.1, December, 1990, Appendix A). (Two of these equations, expressing analytical accuracy and precision, have been presented in section 12 of this QAPP.) Such formulae make pertinent allowances for matrix type. All calculations are checked by the Organic Section supervisor at the conclusion of each operating day. Errors are noted, corrections are made, but the original notations are crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis, and TCLP results will not be matrix spike recovery-corrected.

Quality control data (e.g. laboratory duplicates, surrogates, matrix spikes, and matrix spike duplicates) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the Laboratory QA Manager for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately quaified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptance limits, and any other anomalous conditions encountered during sample analysis. After the Lab QA Manager approves these data, they are considered ready for third party data validation.

9.2 Data Validation

Data validation procedures shall be performed for both field and laboratory operations as described below:

9.2.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the Field Manager, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the log book.

9.2.2 Procedures to Validate Laboratory Data

Procedures to validate laboratory data will be derived exclusively from the U.S. EPA's Contract Laboratory Program, National Functional Guidelines For Organic Data Review, Multi-Media, Multi-Concentration (OLMO1.O) and Low Concentration Water (OLCO1.O), December, 1990. Essentially, all technical holding times shall be reviewed, the GC/MS instrument performance check sample results shall be evaluated, results of initial & continuing calibration will be reviewed and evaluated by trained reviewers independent of the laboratory. (The role of the Data Validators is indicated in the Project Organization (Section 2) of this QAPP.) Also, results of all blanks, surrogate spikes, matrix spikes/matrix spike duplicates, laboratory control samples, internal standards, target compound identification & quantitation, tentatively identified compounds, system performance checks shall be performed for volatile organic compounds by the Data Validator. Additionally, a method detection limit study will be performed, at the request of the U.S. EPA per the provisions of Federal Register, Vol. 49, no. 209, October 26, 1984, pp.198-199, shall be conducted. The results shall also be validated. One hundred percent of the data shall be validated.

All CLP forms summarizing this information will be checked as well. The overall completeness of the data package will also be evaluated by the Data Validator. Completeness checks will be administered on all data to determine whether deliverables specified in the RFI Workplan and QAPP are present. At a minimum, deliverables will include sample chain-of-custody forms, analytical results, QC summaries, and supporting raw data from instrument printouts. The reviewer will determine whether all required items are present and request copies of missing deliverables.

[NOTE: This is a data validation example for organic analysis. A similar process will be outlined for inorganic analyses and general parameters (i.e. fluoride, chloride, sulfate, etc.)]

9.3 Data Reporting

Data reporting procedures shall be carried out for field and laboratory operations as indicated below:

9.3.1 Field Data Reporting

Field data reporting shall be conducted principally through the transmission of report sheets containing tabulated results of all measurements made in the field, and documentation of all field calibration activities.

9.3.2 Laboratory Data Reporting

The task of reporting laboratory data (to the U.S. EPA) begins after the validation activity has been concluded. The Laboratory QA Manager must perform a final review of the report summaries and case narratives to determine whether the report meets project requirements. In addition to the record of chain-of-custody, the report format shall consist of the following:

1. Case Narrative:

   i. Date of issuance
   ii. Laboratory analysis performed
   iii. Any deviations from intended analytical strategy
   iv. Laboratory batch number
   v. Numbers of samples and respective matrices
   vi. Quality control procedures utilized and also references to the acceptance criteria
   vii. Laboratory report contents
   viii. Project name and number
   ix. Condition of samples 'as-received'
   x. Discussion of whether or not sample holding times were met
   xi. Discussion of technical problems or other observations which may have created analytical difficulties
   xii. Discussion of any laboratory quality control checks which failed to meet project criteria
   xiii. Signature of the Laboratory QA Manager

2. Chemistry Data Package

i. Case narrative for each analyzed batch of samples
ii. Summary page indicating dates of analyses for samples and laboratory quality control checks
iii. Cross referencing of laboratory sample to project sample identification numbers
iv. Data qualifiers to be used should be adequately described
v. Sample preparation and analyses for samples
vi. Sample results
vii. Raw data for sample results and laboratory quality control samples
viii. Results of (dated) initial and continuing calibration checks, and GC/MS tuning results
ix. Matrix spike and matrix spike duplicate recoveries, laboratory conrol samples, method blank results, calibration check compoounds, and system performance check compound results
x. Labelled (and dated) chromatograms/spectra of sample results and laboratory quality control checks
xi. Results of tentatively identified compounds

The data package submitted will be a "CLP-like" data package consisting of all the information presented in a CLP data package (but without the CLP forms).

QAPP ELEMENT 12

PERFORMANCE AND SYSTEMS AUDITS

The purpose of performance and system audits is to verify that the quality assurance/quality control programs are strictly followed by the appropriate personnel during the field acuvitues (e.g. sample collection, preservation, and transportation) and laboratory activities (e.g. sample preparation, instrument calibration, sample analysis, data validation, and final evidence documentation).

The internal audits will be performed by the organization primarily responsible for performing the task. The external audits will be performed by U.S. EPA.

The performance audit is an independent check to evaluate the quality of data being generated. The system audit is an on-site review and evaluation of the facilities, instrumentation, quality control practices, data validation, and documentation practices.

This element will address the following information:

1) Field Performance and System Audits:

a) Internal and external performance and system audits to be performed will be addressed.

b) Staff responsible for performing these audits will be stated.

c) The frequency of the audit will be stated.

d) The audit procedures (including a checklist) and the documentation of audit procedures will be stated.

2) Laboratory Performance and System Audits:

a) Internal and external performance and system audits to be performed will be addressed.

b) Staff responsible for performing these audits will be stated.

c) The frequency of the audit will be stated.

d) The audit procedures (including a checklist) and the documentation of audit procedures will be stated.

SECTION 10

PERFORMANCE AND SYSTEM AUDITS

10.0 Performance and System Audits and Frequency

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSP and QAPP. The audits of field and laboratory activities include two independent parts: internal and external audits.

10.1 Field Performance and System Audits

10.1.1 Internal Field Audits

10.1.1.1 Internal Field Audit Responsibilities

Internal audits of field activities including sampling and field measurements will be conducted by the [Contractor] QA Officer.

10.1.1.2 Internal Field Audit Frequency

These audits will verify that all established procedures are being followed. Internal field audits will be conducted at least once at the beginning of the site sample collection activities. **[If the project duration is long (e.g. greater than one year), a periodic frequency should be stated (e.g. semi-annually)].**

10.1.1.3 Internal Field Audit Procedures

The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc. Followup audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the remediation. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation. The field audit checklist to be used for this project is submitted with this QAPP.

10.1.2 External Field Audits

10.1.2.1 External Field Audit Responsibilities

External field audits may be conducted by the U.S. EPA [Permit Writer/Project Coordinator].

10.1.2.2 External Field Audit Frequency

External field audits may be conducted any time during the field operations. These audits may or may not be announced and are at the discretion of the U.S. EPA

10.1.2.3 Overview of the External Field Audit Process

External field audits will be conducted according to the field activity information presented in the QAPP.

10.2 Laboratory Performance and Systems Audits

10.2.1 Internal Laboratory Audits

10.2.1.1 Internal Lab Audit Responsibilities

The internal laboratory audit will be conducted by the [Contractor] QA Officer.

10.2.1.2 Internal Lab Audit Frequency

The internal lab system audits will be done on an annual basis while the internal lab performance audits will be conducted on a quarterly basis.

10.2.1.3 Internal Lab Audit Procedures

The internal lab system audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. The performance audits will involve preparing blind QC samples and submitting them along with project samples to the laboratory for analysis throughout the project. The [Contractor] QA Officer will evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable QC performance. The laboratory audit checklist has been submitted.

10.2.2 External Laboratory Audits

10.2.2.1 External Lab Audit Responsibilities

An external audit will be conducted by U.S. EPA Region 5 Central Regional Laboratory (CRL).

10.2.2.2 External Lab Audit Frequency

An external lab audit will be conducted at least once prior to the initiation of the sampling and analysis activities. These audits may or may not be announced and are at the discretion of the U.S. EPA.

10.2.2.3 Overview of the External Lab Audit Process

[redacted] lab audits will include (but not be limited to) review of laboratory [illegible] procedures, laboratory on-site audits, and/or submission of performance evaluation samples to the laboratory for analysis.

QAPP ELEMENT 13

PREVENTATIVE MAINTENANCE

The following types of preventative maintenance will be described in this section:

1) Field Instrument Preventative Maintenance

Maintenance procedures for equipment such as thermometers, pH and conductivity meters will be addressed. The use of HNu detectors and organic vapor analyzer systems will be addressed in this Section of the QAPP unless used for health and safety purposes. It will be indicated how frequently such instruments are checked (possibly as part of daily calibration), and where and how frequently such checks will be documented. Lists of critical spare parts such as tape, pH probes and batteries should be presented in the QAPP, in tabular format (this table can be included in an appendix). Any other means for ensuring that equipment to be used in the field is routinely serviced, maintained or repaired will be stated.

2) Laboratory Instrument Preventative Maintenance

These procedures are designed to minimize the occurrence of instrument failure and other system malfunctions and will also be included in this section of the QAPP. The laboratory's (ies') schedule for maintenance of each instrument to be used during implementation of the project will be presented in tabular format. A list of critical spare parts necessary for maintaining this equipment will also be presented in tabular format. Although it is understood that laboratory instruments are usually maintained in accordance with manufacturer's specifications, it is not acceptable to submit copies of instrument manuals to satisfy the intent of this element. If preventative maintenance is performed through a vendor contract, this information will be stated.

SECTION 11

PREVENTATIVE MAINTENANCE

11.1. Field Instrument Preventative Maintenance

The field equipment for this project includes thermometers, pH meter, and conductivity meter. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use. Calibration checks will be documented on the Field Meter/calibration log sheets. are indicated in a submitted Table. The maintenance schedule and trouble-shooting procedures for field instruments are indicated in a submitted table . Critical spare parts such as tape, pH probes, and batteries will be kept on-site to reduce downtime. Backup instruments and equipment will be available on-site or within 1 day shipment to avoid delays in the field schedule.

11.2. Laboratory Instrument Preventative Maintenance

As part of their QA/QC program, a routine preventative maintenance program is conducted by [laboratory name] to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees shall regularly perform routine scheduled maintenance and repair of [or to coordinate with the vendor for the repair of] all instruments. All maintenance that is performed shall be documented in the laboratory's operating record. All laboratory instruments are maintained in accordance with manufacturer's specification

A Table [in the Appendix to this Model QAPP] provides the frequency which components of key analytical instruments or equipment will be serviced.

QAPP ELEMENT 14

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

In order to address this element of the QAPP, the procedures and equations to be used to aid in assessing the accuracy and precision of analytical data, and completeness of data collection shall be clearly documented. The equations to be used for calculation of percent recovery (%R), relative percent difference (RPD) and percent valid data will be indicated.

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate for organic analysis, and laboratory duplicate analyses for inorganic analysis. The relative percent difference will be calculated for each pair of duplicate analyses as indicated below.

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

Where: S = First sample value (original or matrix spike value);

D = Second sample value (duplicate or matrix spike duplicate value)

Accuracy of laboratory results will be assessed for compliance with the established quality control criteria that are cited in Section 3 of the QAPP using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, field blank, and bottle blanks. The percent recovery of matrix spike samples will be calculated as indicated below.

$$\%R = \frac{A - B}{C} \times 100$$

Where:

A = The analyte concentration determined experimentally from the spiked sample;

B = The background level determined by a separate analysis of the unspiked sample;

C = The amount of the spike added.

Data Completeness will be assessed for compliance with the amount of data required for decision making. The completeness is calculated as indicated below:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

Where "Valid Data" refers to numbers of investigational samples obtained or to be obtained for a specific purpose, or in order to satisfy a particular project objective.

Data completeness, precision, and accuracy must be addressed in the QAPP, with respect to both field and laboratory samples. In the sample section addressing this element, a means of acceptably providing this information to the U.S. EPA is presented.

SECTION 12

SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

12.1 Accuracy Assessment

In order to assure the accuracy of the analytical procedures, an environmental sample is randomly selected from each sample shipment received at the laboratory, and spiked with a known amount of the analyte or analytes to be evaluated. In general, a sample spike should be included in every set of 20 samples tested on each instrument. The spike sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. Daily control charts are plotted for each commonly analyzed compound and kept on instrument-specific, matrix - specific, and analyte - specific bases. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

12.2 Precision Assessment

Spiked samples are prepared by choosing a sample at random from each sample shipment received at the laboratory, dividing the sample into equal aliquots, and then spiking each of the aliquots with a known amount of analyte. The duplicate samples are then included in the analytical sample set. The splitting of the sample allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate sample. The relative percent difference (RPD) between the spike and duplicate spike are calculated and plotted. The RPD is calculated according to the following formula:

$$RPD = \frac{\text{Amount in Spike 1} - \text{Amount in Spike 2}}{0.5(\text{Amount in Spike 1} + \text{Amount in Spike 2})} \times 100$$

12.3 Completeness Assessment

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

QAPP ELEMENT 15

CORRECTIVE ACTION

Information included in this QAPP element will address the entire project, not just the laboratory operation. More specifically, corrective action will focus on three general areas. These areas are 1) Field Corrective Action; 2) Laboratory Corrective Action; and 3) Corrective Action during Data Validation and Data Assessment. For each of the three areas, certain procedures and mechanisms must be stated. These include:

1. The mechanism of triggering the initiation of corrective actions;
2. The proper procedures to be used for initiating, developing, approving, and implementing the corrective actions;
3. Identification of the project personnel responsible for initiating, developing, approving, and implementing the corrective actions;
4. Alternate corrective actions to be taken; and
5. The documentation process for this corrective action will be stated

Corrective actions may be required for two classes of problems: 1) analytical and field equipment problems and 2) noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review.

An example of how the corrective action element for a particular project may be conveyed to the U.S. EPA in a QAPP follows. Any information inside square brackets ([]) denotes replacing this information with facility and/or contractor-specific names or information.

SECTION 13

CORRECTIVE ACTION

13.0 Corrective Action

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out of quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should only be implemented after approval by the [Facility] project manager, or his designee, the [Facility] field operations manager. If immediate corrective action is required, approvals secured by telephone from the [Facility] project manager should be documented in an additional memorandum.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the [Facility] project manager, who in turn will notify the U.S. EPA RCRA Permit Writer/Project Coordinator. If the problem is analytical in nature, information on these problems will be promptly communicated to the U.S. EPA, Quality Assurance Section. Implementation of corrective action will be confirmed in writing through the same channels.

Any nonconformance with the established quality control procedures in the QAPP or Field Sampling Plan will be identified and corrected in accordance with the QAPP. The [Facility] project manager, or his designee, will issue a nonconformance report for each nonconformance condition. [If the activity is being performed in accordance with a legal agreement, this, as well as any other sections of the QAPP, must comply with the legal agreement.]

13.1 Field Corrective Action

Corrective action in the field can be needed when the sample network is changed (i.e. more/less samples, sampling locations other than those specified in the QAPP, etc.), sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. In general, the field team (technician, [Facility] field operations

manager, [Facility] project manager, and [Facility's] quality assurance officer) may identify the need for corrective action. The field staff in consultation with the field operation manager will recommend a corrective action. The [Facility] field operations manager will approve the corrective measure which will be implemented by the field team. It will be the responsibility of the [Facility] field operations manager to ensure the corrective action has been implemented.

If the corrective action will supplement the existing sampling plan (i.e. additional soil borings) using existing and approved procedures in the QAPP, corrective action approved by the [Facility] field operations manager will be documented. If corrective actions resulting in less samples (or analytical fractions), alternate locations, etc. which may cause project quality assurance objectives not to be achieved, it will be necessary that all levels of project management including the [Facility] project manager, and the U.S. EPA RCRA Permit Writer/Project Coordinator concur with the proposed action.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The [facility] quality assurance officer will identify deficiencies and recommended corrective action to the [Facility] project manager. Implementation of corrective actions will be performed by the [Facility] field operations manager and field team. Corrective action will be documented in quality assurance reports to the entire project management.

Corrective actions will be implemented and documented in the field record books. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by the U.S. EPA RCRA Permit Writer/Project Coordinator.

13.2 Laboratory Corrective Action

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with lab analysts and section leaders, it may be necessary for the laboratory Quality Control Coordinator to approve the implementation of corrective action. The submitted standard operating procedures (SOPs) specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample

extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. A summary of method-specific corrective actions are found in this QAPP.

The bench chemist will identify the need for corrective action. The [Laboratory] manager, in consultation with the [Laboratory] supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The [Laboratory] QA manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, it will be necessary to inform all levels of project management including the U.S. EPA RCRA Permit Writer/Project Coordinator to concur with the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the [laboratory]'s corrective action log (signed by analyst, section leader and quality control coordinator), and the narrative data report sent from the laboratory to the [contractor] data validator. If corrective action does not rectify the situation, the laboratory will contact the [Facility] project manager.

Section 13.3 Corrective Action During Data Validation and Data Assessment

The facility may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (e.g. the holding time [illegible] is not exceeded, etc.) When the [Contractor] data assessor identifies a corrective action situation, it is the [Facility] project manager who will be responsible for approving the implementation of corrective action, including resampling, during data assessment. All corrective actions of this type will be documented by the [Facility] QA manager.

QAPP ELEMENT 16

QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality assurance reports must be submitted on a periodic basis to management during the course of the project. This is done to ensure that problems arising during the sampling and analysis phases of the project are investigated and corrected. This report will be submitted monthly (at a minimum) and can be part of the monthly progress report. This report at a minimum, will contain:

1. Data validation and assessment results since the last report; and
2. Field and laboratory audit results performed since the last report; and
3. Significant QA/QC problems, recommended solutions, and results of corrective actions.

The contents and nature of all QA reports that will be generated should be indicated in this section of the QAPP. For instance, The type of report, be it written or oral, interim versus final, should be specified in the QAPP. Furthermore, the contents of the QA reports should be specified. Some examples of relevant topics which may appear in QA reports are given below:

1. Minor changes in QAPP (NOTE: Major changes to procedures or responsibilities requires approval from the Region 5 QA Manager.);
2. Summary of QA/QC programs, training and other miscellaneous accomplishments;
3. Results of technical systems and performance evaluation audits;
4. Data quality assessment in terms of precision, accuracy, representativeness, completeness, comparability, and method detection limit;
5. Indication of whether the QA objectives were met; and
6. Limitations on use of the measurement data.

SECTION 14

QUALITY ASSURANCE REPORTS TO MANAGEMENT

The deliverables associated with the tasks identified in the RFI Workplan and monthly progress reports will contain separate QA sections in which data quality information collected during the task is summarized. Those reports will be the responsibility of the [Facility] project manager and will include the [Facility] Quality Assurance Officer report on the accuracy, precision, and completeness of the data as well as the results of the performance and system audits, and any corrective action needed or taken during the project.

14.1 Contents of Project QA Reports

The QA reports will contain on a routine basis all results of field and laboratory audits, all information generated during the past month reflecting on the achievement of specific data quality objectives, and a summary of corrective action that was implemented, and its immediate results on the project. The status of the project with respect to the Project Schedule included in the QAPP will be determined. Whenever necessary, updates on training provided, changes in key personnel, anticipated problems in the field or lab for the coming month that could bear on data quality along with proposed solutions, will be reported. Detailed references to QAPP modifications will also be highlighted. All QA reports will be prepared in written, final format by the [Facility] project manager or his designee.

In the event of an emergency, or in case it is essential to implement corrective action immediately, QA reports can be made by telephone to the appropriate individuals, as identified in the Project Organization or Corrective Action sections of this QAPP. However, these events, and their resolution will be addressed thoroughly in the next issue of the monthly QA report.

14.2 Frequency of QA Reports

The QA Reports will be prepared on a monthly basis, and will be delivered to all recipients by the end of the first full week of the month. The reports will continue without interruption, until the project has been completed. The frequency of any emergency reports that must be delivered verbally cannot be estimated at the present time.

14.3 Individuals Receiving/Reviewing QA Reports

All individuals identified in the Project Organization chart will receive copies of the monthly QA report.

APPENDIX TO MODEL QAPP

The documents enclosed in this Appendix provide examples of how certain information should be presented to the U.S. EPA Region 5. This Appendix was cited in previous sections of this Model QAPP, but the nature of the examples presented herein may not exactly correspond to the text of previous example sections. The following Tables and one guideline providing instruction on how to present Standard Operating Procedures, are included in this Appendix.

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sediment (µg/kg)
Chloromethane	74-87-3	SW-846[2] METs 8240, 5030	GC/MS Purge and Trap	10	10
Dibromomethane	74-83-9	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Vinyl Chloride	75-01-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Chloroethane	75-00-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Methylene Chloride	75-09-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Acetone	67-64-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
Carbon Disulfide	75-15-0	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
1,1-Dichloroethene	75-35-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,1-Dichloroethane	75-35-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,2-Dichloroethane	75-35-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Chloroform	67-66-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sedimer (µg/kg)
1,2-Dichloroethane (Total)	107-06-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	10	10
Acetonitrile	75-05-8	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
Allyl Chloride	107-05-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Benzyl Chloride	100-44-7	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
2-Chloroethyl vinyl ether	110-75-8	SW-846 METs 8240, 5030	GC/MS Purge And Trap	10	10
2-Butanone	78-93-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	100	100
1,1,1-Trichloroethane	71-55-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Carbon Tetrachloride	56-23-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Bromodichloromethane	75-27-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,1,2,2-Tetrachloroethane	79-34-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,2-Dichloropropane	78-87-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sediment (µg/kg)
trans-1,3-Dichloropropene	5061-02-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Trichloroethene	79-01-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Chlorodibromomethane	124-48-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
1,1,2-Trichloroethane	79-00-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Benzene	71-43-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
cis-1,3-Dichloropropene	10061-01-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Chloroprene	126-99-8	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
1,2-Dibromo-3-Chloropropane	96-12-8	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
1,2-Dibromoethane	106-93-4	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
1,4-Dichloro-2-butene	764-41-0	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
Bromoform	75-25-2	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sediment (µg/kg)
2-Hexanone	591-78-6	SW-846 METs 8240, 5030	GC/MS Purge and Trap	50	50
4-Methyl-2-pentanone	108-10-1	SW-846 METs 8240, 5030	GC/MS Purge and Trap	50	50
Tetrachloroethene	127-18-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Toluene	108-88-3	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Chlorobenzene	108-90-7	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Ethyl Benzene	100-41-4	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Styrene	100-42-5	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Total Xylenes	1330-20-7	SW-846 METs 8240, 5030	GC/MS Purge and Trap	5	5
Dichlorodifluoromethane	75-71-8	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
trans-1,2-Dichloroethene	156-60-5	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
Ethyl methacrylate	97-63-2	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sediment (µg/kg)
Isobutyl Alcohol	78-83-1	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
Methyacrylonitrile	91-80-5	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
Methyl iodide	74-88-4	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
Methyl methacrylate	80-62-6	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	50
Pentachloroethane	76-01-7	SW-846 METs 8240, 5030	GC/MS Purge And Trap	10	10
Propionitrile	78-02-9	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
1,1,1,2-Tetrachloroethane	630-20-6	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
1,2,3-Trichloropropane	96-18-4	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5
Vinyl Acetate	108-05-4	SW-846 METs 8240, 5030	GC/MS Purge And Trap	50	50
Acrolein	107-02-8	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100
Acrylonitrile	107-13-1	SW-846 METs 8240, 5030	GC/MS Purge And Trap	100	100

TABLE

Target Compound List
Volatile Organics Analytical Methods Summary

Volatile Organic Compounds	Chemical Abstracts Service Registry Number	Method Reference	Description	EQL[1] Groundwater (µg/L)	EQL[1] Low Soil/Sedime (µg/kg)
Trichlorofluoromethane	75-69-4	SW-846 METs 8240, 5030	GC/MS Purge And Trap	5	5

[1]EQL: Estimated Quantitation Limit is from SW-846 (reference footnote 2 below).
[2]SW-846: EPA Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, SW-846, 3rd Edition, 1990.

TABLE 2

Quality Control Performance Criteria for Matrix Spikes/Matrix Spike Duplicates and Surrogates

	Matrix Spike/Dup			
	% Recovery		% RPD	
	Water	Soil	Water	Soil
Volatile Organic Compounds				
1,1-Dichloroethene	61-145	59-173	14	22
Trichloroethene	71-120	62-137	14	23
Benzene	76-127	66-142	11	21
Toluene	76-125	59-139	13	21
Chlorobenzene	75-130	60-133	13	21

TABLE . 3

Quality Control Performance Criteria for Matrix Spikes/Matrix Spike Duplicates and Surrogates

	Matrix Spike/Dup				Surrogate	
	%Recovery		%RPD		%Recovery	
	Water	Soil	Water	Soil	Water	Soil
Pesticides/PCBs						
Tetrachloro-m-xylene					60-150	60-150
Decachlorobiphenyl					60-150	60-150
γ-BHC (Lindane)	56-123	46-127	15	50		
Heptachlor	40-131	35-130	20	31		
Aldrin	40-120	34-132	22	43		
Dieldrin	52-126	31-134	18	38		
Endrin	56-121	42-139	21	45		
4,4'-DDT	38-127	23-134	27	50		

TABLE

Quality Control Performance Criteria
for Matrix Spikes/Matrix Spike Duplicates and Surrogates

	Matrix Spike/Dup				Surrogate	
	%Recovery		%RPD		%Recovery	
	Water	Soil	Water	Soil	Water	Soil
Semivolatile Organic Compounds						
Nitrobenzene-d5					35-114	23-120
2-Fluorobiphenyl					43-116	30-115
Terphenyl-d14					33-141	18-137
Phenol-d5					10-94	24-113
2-Fluorophenol					21-100	25-121
2,4,6-Tribromophenol					10-123	19-122
Phenol	12-110	26-90	42	35		
2-Chlorophenol	27-123	25-102	40	50		
1,4-Dichlorobenzene	36-97	28-104	28	27		
N-Nitroso-di-N-propylamine	41-116	41-126	38	38		
1,2,4-Trichlorobenzene	39-98	38-107	28	23		
4-Chloro-3-Methylphenol	23-97	26-103	42	33		
Acenaphthene	46-118	31-137	31	19		
4-Nitrophenol	10-80	11-114	50	50		
2,4-Dinitrotoluene	24-96	28-89	38	47		
Pentachlorophenol	9-103	17-109	50	47		
Pyrene	26-127	35-142	31	36		

TABLE 5
SUMMARY OF SAMPLING AND ANALYSIS PROGRAM

SWMU[1]	Sample Matrix	Field Parameters	Laboratory[3] Parameters	Investigative[4] Samples		Field Quality Assurance/Quality Control Samples						Matrix Total
						Matrix Duplicates		Matrix Spike/[3] Matrix Spike Duplicates		Blanks[4]		
				No.	Total	No.	Total	No.	Total	No.	Total	
#1-DSO Landfill	Soil	Qualitative screening with photoionization detector	Metals[2] Volatiles[2] Semivolatiles[2]	88 6 6	88 6 6	9 1 1	9 1 1	4 1 1	4 1 1	0 0 0	0 0 0	101 8 8
#2-Storm water Retention Pond	Water	Qualitative screening with photoionization detector pH Specific Conductance Temperature	Metals Volatiles Semivolatiles Cyanide	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 2 1 1	4 5 4 4
	Soil/ Sediment	Qualitative screening with photoionization detector	Metals Volatiles Semivolatiles Cyanide	5 5 5 5	5 5 5 5	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	6 6 6 6
#8, 9-Waste Acid Tanks	Soil	Qualitative screening with photoionization detector Field pH	Metals pH	25 25	25 25	3 3	3 3	1 1	1 1	0 0	0 0	29 29
#13-Waste Acid Pit	Soil	Qualitative screening with photoionization detector Field pH	Metals pH	14 14	14 14	2 2	2 2	1 1	1 1	0 0	0 0	17 17

(1) Figure 1-2 shows the location of each SWMU.
(2) Samples will be composited for metals and semivolatiles. See Section 3.1.2 of Work Plan for a description of sample locations.
(3) Analytes selected include 40 CFR Part 264, Appendix IX metals, cyanide, Target compound list volatiles and semivolatiles. See Tables 4-4, 4-5, and 4-6.
(4) The frequency of sampling is one for this RFI.
(5) Additional sample volume required for matrix spike/matrix spike duplicate.

TABLE 5

SWMU[1]	Sample Matrix	Field Parameters	Laboratory[3] Parameters	Investigative[4] Samples		Field Quality Assurance/Quality Control Samples						
						Matrix Duplicates		Matrix Spike/[5] Matrix Spike Duplicates		Blanks[6]		Matrix Total
				No.	Total	No.	Total	No.	Total	No.	Total	
#21, 22-Slag Reclaim Dust Collector and Dumpster	Soil	Qualitative screening with photoionization detector	Metals	3	3	1	1	0	0	0	0	4
#25-Outfall 005	Water	Qualitative screening with photoionization detector	Semivolatiles	2	2	1	1	1	1	1	1	5
			Volatiles	2	2	1	1	1	1	2	2	6
		pH	Metals	2	2	1	1	1	1	1	1	5
		Specific Conductance	Cyanide	2	2	1	1	1	1	1	1	5
		Temperature										
	Soil	Qualitative screening with photoionization detector	Semivolatiles	3	3	1	1	1	1	0	0	4
			Volatiles	3	3	1	1	1	1	0	0	4
			Metals	3	3	1	1	1	1	0	0	4
			Cyanide	3	3	1	1	1	1	0	0	4
Background Samples	Soil	Qualitative screening with photoionization detector	Metals	20	20	2	2	1	1	0	0	23
			Volatiles	5	5	1	1	1	1	0	0	7
			Semivolatiles	5	5	1	1	1	1	0	0	7
		Field pH	Cyanide	20	20	2	2	1	1	0	0	23

(1) Figure 1-2 shows the location of each SWMU.
(2) Samples will be composited for metals and semivolatiles. See Section 3.1.2 of Work Plan for a description of sample locations.
(3) Analytes selected include 40 CFR Part 264, Appendix IX metals, cyanide, Target compound list volatiles and semivolatiles. See Tables 4-4, 4-5, and 4-6
(4) The frequency of sampling is one for this RFI.
(5) Additional sample volume required for matrix spike/matrix spike duplicate.
(6) Blank totals include estimated trip, field blanks, and rinse blanks.

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
FAA	SW-846	4	Correlation coefficient must be ≥ 0.995	At least daily, or as required (when CCV fails acceptance criteria)	Every calibration	90-110%R	Every 10 analytical samples	90-110%R
	EPA600/4-79/080	4				90-110%R		90-110%R
	CLP	4				90-110%R		90-110%R
CVAA	SW-846	4				80-120%R		80-120%R
	EPA600/4-79/080	4				80-120%R		80-120%R
	CLP	4				80-120%R		80-120%R
ICP	SW-846	1				90-110%R		90-110%R
	EPA600/4-79/080	1				90-110%R		90-110%R
	CLP	1				90-110%R		90-110%R
GFAA	SW-846	4				85-115%R		85-115%R
	EPA600/4-79/080	4				85-115%R		85-115%R
	CLP	4				90-110%R		90-110%R
pH Meter	SW-846	3	±0.1 STD units of true value			± 0.1 STD units of true value		± 0.1 STD unit of true value
	CLP	3						

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS volatiles	SW-846 (8240,8260)	5	%RSD<30% (CCC) 1,1-dichloroethene; chloroform 1,2-dichloropropene; toluene ethyl benzene; vinyl chloride RF>0.30(SPCC) chloromethane; 1,1-dichloroethane; bromoform (0.25); 1,1,2,2-tetrachloroethene; chlorobenzene	As needed	As needed	± 20%	daily 12 hr.	CCC %D <25% same SPCC criteria as initial calibration
	40CFR136, 624	5	all cmpds %RSD <35% or use calibration curve	As needed	As needed	± 20%R	daily 24 hr.	Compare w/Table 9 5 "Q" (attached)
	CLP SOW 2/88	5	same as SW846	As needed	As needed, usually w/PE's	± 20%R	daily 12 hr.	same as SW 846

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS-volatiles	CLP SOW OLMO1.5	5	min RF Bromoform 0.10 Vinyl Chloride 0.10 1,1-dichloroethene 0.10 1,1-dichloroethane 0.20 Chloroform 0.20 1,2-dichloroethane 0.10 1,1,1-trichloroethane 0.10 carbon tetrachloride 0.10 bromodichloromethane 0.20 cis-1,3-dichloropropene 0.20 trichloroethene 0.30 dibromochloromethane 0.10 1,1,2-trichloroethane 0.10 benzene 0.50 trans-1,3 dichloropropene 0.10 bromoform 0.10 tetrachloroethene 0.20 1,1,2,2-tetrachloroethane 0.50 toluene 0.40 chlorobenzene 0.50 ethylbenzene 0.10 styrene 0.30 xylene (total) 0.30 bromofluorobenzene 0.20 all % RSD <20.5 Other target compounds must meet minimum RF of 0.10 No %RSD criteria	As needed	As needed, usually w/PE's	± 20%R	Daily every 12 hours	RF criteria same as initial cal %D <25.0
	EPA 524.2	5	% RSD <20% or use cal curve - all target compounds	As needed	As needed	± 20%R	Daily, every 8 hours	All compounds RF %D <30% ISTD areas >30%, <150% of initial cal

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	SW846-8270	5	%RSD < 30% (CCC) acenaphthene 1,4 dichlorobenzene hexachlorobutadiene N-nitroso-diphenylamine di-octylphthalate fluoranthene benzo(a)pyrene 4-chloro-3-methylphenol 2,4-dichlorophenol 2-nitrophenol phenol pentachlorophenol 2,4,6-trichlorophenol RF >0.05(SPCC) N-nitrosodipropylamine hexachlorocyclopentadiene 2,4-dinitrophenol 4-nitrophenol	As needed	As needed	± 20%R	Daily, every 12 hours	CCC % D < 25% same SPCC criteria as initial cal
	40CFR136 625	5	%RSD < 35% or cal. curve all compounds	As needed	As needed	± 20%R	Daily every 24 hours	% D < 20%
	CLP SOW 2/88	5	Same as SW846-8270	As needed	As needed w/RF's	± 20%R	Daily every 12 hours	Same as SW846-8270

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLM01.5	5	min. RF phenol 0.80 bis(2-chloroethyl)ether 0.70 2-chlorophenol 0.80 1,3-dichlorobenzene 0.60 1,4-dichlorobenzene 0.50 1,2-dichlorobenzene 0.40 2-methylphenol 0.70 4-methylphenol 0.60 N-nitrosodipropylamine 0.50 hexachloroethane 0.30 nitrobenzene 0.20 isophorone 0.40 2-nitrophenol 0.10 2,4-dimethylphenol 0.20 bis(2-chloroethoxy)methane 0.30 2,4-dichlorophenol 0.20 1,2,4-trichlorobenzene 0.20 naphthalene 0.70 4-chloro-3-methylphenol 0.20 2-methylnaphthalene 0.30 2,4,6-trichlorophenol 0.20 2,4,5-trichlorophenol 0.20 2-chloronaphthalene 0.80 acenaphthylene 1.30 2,6-dinitrotoluene 0.20 acenaphthene 0.80 dibenzofuran 0.80 2,4-dinitrotoluene 0.20 4-chlorophenylphenylether 0.40 fluorene 0.90 4-bromophenylphenylether 0.10 hexachlorobenzene 0.80					%D < 25 RF criteria same as initial calibration

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference[1]	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[4]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[4]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLM01.5		pentachlorophenol 0.05 phenanthrene 0.70 anthracene 0.70 fluoranthene 0.60 pyrene 0.60 benz(a)anthracene 0.80 chrysene 0.70 benzo(b)fluoranthene 0.70 benzo(k)fluoranthene 0.70 benzo(a)pyrene 0.70 indeno(1,2,3,cd)pyrene 0.50 dibenz(a,h)anthracene 0.40 benzo(ghi)perylene 0.50 nitrobenzene d5 0.20 2-fluorobiphenyl 0.70 terphenyl-d_{14} 0.50 phenol-d_5 0.80 2-fluorophenol 0.60 2 chlorophenol-d_4 0.80 1,2-dichlorobenzene-d_4 0.40 %RSD < 20.5%. Other target compounds have no %RSD but must have RF > 0.01					
	EPA525	6	%RSD < 30% all compounds. Chromatographic separation of isomers	As needed	As needed	± 20%R	daily, every eight hours	RF %D < 30% ISTD areas > 30% < 150% from initial cal

Table . 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/NPD	N-P containing pesticides EPA 507	3	RF < 20% RSD or single point (single point must be within 20% of sample concentration)	As needed when CCV > 20% diff., upon detection of analyte after running low level single point to demonstrate detectability[2]	quarterly	20%D	2 times daily, beginning and end of day	20%D
	Organophosphorus pesticides SW-846 8141	5	RF < 20% RSD or cal. curve		quarterly	15%D	Daily	15%D
	Simetryn & Terbutryn EPA 619	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std	10%D	Each working shift	10%D
	Nitrosamines EPA 607	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std	15%D	Each working day	15%D
GC/FID	115	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	Quarterly	15%D	Daily	15%D
	SW-846 8100	5	RF < 20% RSD or cal. curve	With each analytical sequence	As needed, with prep of new std	15%D	Daily	15%D
	SW-846 8030	5	RF < 20% RSD or cal. curve	As needed when CCV > 15% D	As needed with prep of new standard	15%D	Daily, 10%, ending	15%D

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
HPLC	EPA 531.1	3-5	RF < 20% RSD or single point or calibration curve	As needed, when CCV > 20%D	Quarterly	20%D	Min. of 2 1 beg. 1 end	20%D
	SW-846 8310	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D or every 6 months	As needed, with prep of new std	15%D	Daily, 10%	15%D
	EPA 610	3	RF < 10% RSD or cal. curve	When CCV > 15%D	As needed, with prep of new std	15%D CCV vs cal. curve	Daily 10%	15%D
GC-PID/ ELCD	EPA 502.2	3-5	RF < 10% RSD or cal. curve or single point cal.	When CCV > 20%D	As needed, with prep of new std or quarterly	20%D	Daily	20%D
	EPA 601	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria	As needed, with prep of new std	See method 601 Table 2 criteria ~ 30%D (Q Value)	Daily Note: ICV = CCV in this case (different source than calibration stds)	For % Rec see method 601 Table 2 (Q Value)
	EPA 602	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria		See method 602 Table 2 Criteria ~ 25%D (Q Value)		For % Rec see method Table 2 (Q Value)
	SW-846 8010	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed, with prep of new std	15%D	Daily 10%, ending	15%D
	SW-846 8020					15%D		15%D

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-PID/ ELCD	SW-846 8021	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed with prep of new std.	15%D	Daily 10%, ending	15%D
FTIR	EPA 418.1	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std	20%D	Beg. and end of each sequence	20%D
	Standard Methods 503	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	20%D	Beg. and end of each sequence	20%D
GC-ECD	EPA 548.1 (Endothall)	3	Linearity < 20% RSD	Each Run	As needed with each new std. quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15 Conf column %D <20 R.T. Shift, Capp. columns <0.3% RT Shift Mega-Bore Columns <1.5%
	CLP-SOW 2/88	3	Linearity <20% RSD Generate calibration curve for all single analytes detected in samples where the % RSD ≥ 10% Retention time windows: Wide Bore capp. column: ± 0.75% Narrow Bore Capp. column: ± 0.15%	Each run or every 72 hours	As needed with each new std quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15 Conf column %D <20 R.T. Shift, Capp. columns <0.3% RT Shift Mega Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 508	3	Linearity <20% RSD	Each Run	As needed. With each new std Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15 Conf column %D <20 RT Shift, Capp columns <0.3% RT Shift Mega Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20%
	EPA 504	5	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15 Conf column %D <20 RT Shift, Capp columns <0.3% RT Shift Mega-Bore Columns <1.5%
	APHA 509A (Standard Methods)	3	Linearity <20% RSD	Each Run	As needed With each new std Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15 Conf column %D <20 RT Shift, Capp columns <0.3% RT Shift Mega Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 608	3	Linearity <20% RSD	Each Run	As needed. With each new std Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15 Conf column %D <20 R T Shift, Capp. columns <0.3% RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%
	SW-846 8080 SW-846 8150	5	Linearity <20% RSD	Each Run	As needed. With each new std Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf column %D <20 R T. Shift, Capp. columns <0.3% RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 6
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 515.1	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection and beginning and end of run.	Primary column %D <15. Conf column %D <20. RT Shift, Capp columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	EPA OLM01.3	3+Instr. Blank Multi-Comp. Targets Calib. as single point	All peaks 100% resolved. Performance evaluation mixtures (PEMs) ≤ 25.0 RPD. 1 Chromatogram from each of 2 indiv. A&B must yield peak highs of 50-100% of full scale. Resolution of midpoint std. mixes A&B ≥ 90% linearity ≤ 20% RSD except: Surrogates ≤ 30% Any 2 targets ≤ 30% Resolution check mix ≥ 60% Breakdown of DDT & Endrin ≤20%, Combined < 30%	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every 12 hours (PEM or Indiv. A&B)	PEMs and Indiv A&B within RT windows of init. calibration. PEMs RPD ≤ 25.0. Resolution of PEM must be 100%. Resolution of indiv A&B ≥ 90% Breakdown of DDT & Endrin ≤ 20% Combined ≤ 30%

1 Number of Standards Run is 1, unless noted otherwise

1 Only when an unusually large analyte list requires analysis of more than one standard mix for injection by GC/NPD

Table 6 - Attachment
GC/MS - Volatiles
Continuing Calibration Check - EPA Method 624

	Range for 'Q' in ug/L
Benzene	12.8-27.2
Bromoform	14.2-25.8
Carbon tetrachloride	14.6-25.4
Chlorobenzene	13.2-26.8
Chloroethane	7.6-32.4
2-Chloroethylvinyl-ether	D-44.8
Chloroform	13.5-26.5
Dibromochloromethane	13.5-26.5
Bromodichloromethane	13.1-26.9
1,4-Dichlorobenzene	12.6-27.4
1,1-Dichloroethane	14.5-25.5
1,2-Dichloroethane	13.6-26.4
1,1-Dichloroethene	10.1-29.9
1,2-Dichloropropane	6.8-33.2
trans-1,3-Dichloropropene	10.0-30.0
Ethylbenzene	11.8-28.2
Bromomethane	2.8-37.2
Chloromethane	D-40.8
Methylene Chloride	12.1-27.9
1,1,2,2-Tetrachloroethane	12.1-27.9
Tetrachloroethene	14.7-25.3
Toluene	14.9-25.1
trans-1,2-Dichloroethene	13.9-26.1
1,1,1-Trichloroethane	15.0-25.0
1,1,2-Trichloroethane	14.2-25.8
Trichloroethene	13.3-26.7
Trichlorofluoromethane	9.6-30.4
Vinyl Chloride	0.8-39.2

MODEL QAPP

TABLE 7

INSTRUMENT	ACTIVITY	FREQUENCY
Gas Chromatograph/ Mass Spectrometer	Change septum	Monthly/as needed
	Check carrier gas	Daily
	Change carrier gas	When pressure reaches 100 psi
	Change gas filters	Semi-annually/as needed
	Change trap on Tekmar	As needed/poor sensitivity
	Change GC column	As needed/poor sensitivity
	Clean MS source	As needed/poor sensitivity
	Check pump of leaks	Monthly
	Leak Check septum	As needed/when leak suspected
	Check gas flow	As needed
	Clean VOA purge glassware	As needed
	Cut capillary column	As needed
	Replace liner	As needed/contamination susp.
	Replace BNA seal	As needed/contamination susp.
Lachat Quikchem AE	Dry and clean random access sampler	Daily
	Clean sample boats	Daily
	Coat rollers of pump with silicone spray	Every 2500 samples
	Replace pump tubes	Monthly
	Replace flames at port of valve module	Every 25000 samples
	Clean unions of the valve	Every 25000 samples
	Replace O-rings	When necessary
	Clean each port of the valve	Weekly
	Clean fitting of manifolds	Every 25000 samples
TOC	Replace water in IC Chamber	Weekly
	Clean IC chamber	As needed
	Clean underside of IC Inlet valve	As needed
	Check combustion tube	Daily
	Repack quartz wool in comb. tube	As needed
	Check TC inlet valve	Daily
	Clean TC inlet valve	As needed
	Refill acid bottle	When 2/3 empty
GPC	Change seals and oil motor on positive displacement pump	Ever 1500-2000 hours of use
	Repack column	When column flow is restricted or operating pressure increases
	Check system pressure	Check daily when operating
	Replace mesh at column effluent/influent	Replace if torn or wrinkled
	Check calibration, pressure and solvent flow	Check weekly

PREVENTATIVE MAINTENANCE

INSTRUMENT	ACTIVITY	FREQUENCY
Atomic Absorption Furnace	Clean furnace windows	Daily
	Check plumbing connections	Daily
	Change graphite tube	As needed
	Check gases	Daily
	Check autosampler and tubing	Daily
ICAP	Clean filters	Monthly
	Check gas flow	Daily
	Change tubing	Weekly
	Clean nebulizer	As needed
	Check autosampler and tubing	Daily
Gas Chromatograph-Volatiles	Check Hall propanol flow	Daily
	Check Hall furnace temp.	Daily
	Check PID sensitivity	Daily
	Change lamp	As needed
	Rinse purge devices	Daily
	Bake purge devices	Daily
	Check carrier gases	Daily
	Change carrier gases	As needed
	Check column flows	Daily
	Check for gas leaks	At each column change
	Replenish electrolytic conductivity detector solvents	As needed
	Clean transfer lines	As needed
Gas Chromatograph-Semivolatiles	Change septum	Every 100 shots or as needed
	Check carrier gas	Daily
	Change carrier gas	When pressure reaches 250 psi
	Change in-line filters	Every 6 mos. or as needed
	Remove first foot of capillary column	As needed
	Clean ECD	As needed
	Clean Nitrogen-Phosphorous Detector	As needed
	Check system for gas leaks	At each column change
	Replace column	As needed
	Clean FID	As needed
	Replace capillary injection port liner	At column change or as needed
	Replace capillary injection port seal	As column change or as needed
	Measure gas flow	After changing column
	Check syringe	Daily
	Change syringe	As needed

EQUIPMENT MONITORING

EQUIPMENT TYPE	ACTIVITY	FREQUENCY
Ovens	Temperature monitoring	Twice daily
Refrigerators	Temperature monitoring	Twice daily
Incubators	Temperature monitoring	Twice daily
Walk-in Cooler	Temperature monitoring	Twice daily

PREVENTATIVE MAINTENANCE

TABLE 8

INSTRUMENTS	MAINTENANCE PROCEDURES/SCHEDULE	SPARE PARTS IN STOCK
Photovac MicroTIP Photoionization Detector	1. Calibrate beginning and end of each day and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp window every 24 hours of operation. 4. Replace dust filter every 240 hours of operation. 5. Replace sample pump every 5000 hours of operation.	1. Battery charge 2. Spare lamps 3. Spare filter cartridges
Thermo Environmental Model 580B Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean lamp and dust filter as needed. 4. Replace water traps if they become wet.	1. Spare lamps 2. Spare dust filters.
Field Gas Chromatograph	1. Change injector septa daily. 2. Repack column when separation and linearity becomes poor. 3. Clean PID lamp before each initial calibration; change when sensitivity lost. 4. Clean injector port/liner weekly.	1. Septa 2. Empty columns and column packing 3. PID lamps 4. Injector lines
pH Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Replace electrodes as needed.	1. pH buffers 2. Batteries 3. Spare electrodes
Conductivity Meter	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check redline and replace batteries if does not calibrate.	1. Batteries
HNu Model Photoionization Detector	1. Calibrate beginning and end of each day, and as necessary during use. 2. Check battery, and recharge when low. 3. Clean UV lamp, ion chamber, and fan if calibration falls outside 10% of the calibration standard, or if readings are erratic.	1. Battery charge 2. Spare lamps

GUIDELINE FOR THE PREPARATION OF STANDARD OPERATING PROCEDURE

Analytical methods, including both qualitative and quantitative methods, to be used by laboratory selected for a specific project shall be submitted to Region V Quality Assurance Section (QAS) for review/approval prior to use in project activities. These analytical methods should be submitted in a format of standard operating procedure (SOP), which shall describe in detail the exact procedure and material required to analyze the samples. The following items shall be included in the standard operating procedure:

1. Scope and Application.
2. Safety precaution.
3. Sample Size Requirements, and Sample Collection (including sample handling, preservation and holding time).
4. Instrumental Detection Limits and/or Method Detection Limits, and working linear ranges for each parameter.
5. Interferences and Corrective Measurements.
6. Apparatus (including instruments, and instrumental parameters/ conditions), and materials.
7. Reagents.
8. Calibration Procedures (including the preparation of calibration standard solutions, instrument tuning and performance check, etc.).
9. Sample preparations (i.e., extraction, digestion, distillation, etc..
10. Diagram or tables that describes/outlines the procedure.
11. Step-by-step Analytical procedure (including separate procedure for each sample matrix if the method is used for more than one sample matrix).
12. Details of calibration (including the equation used for the calculation).
13. Quality Control (QC) Requirements (i.e., analysis of method blank, reagent blank, duplicate samples, etc.)
14. Data Reporting Requirements (including data reporting units and data reporting format.)

15. Preventative Maintenance

16. References

Method validation data, if available, should be attached to the SOP to support the limitation and applicability of the method. If the method validation data is not avialble, the SOP shall include the effort of method validation to be done prior to the use of this method for sample analysis.

CHAIN OF CUSTODY EXAMPLES

Sample Tag

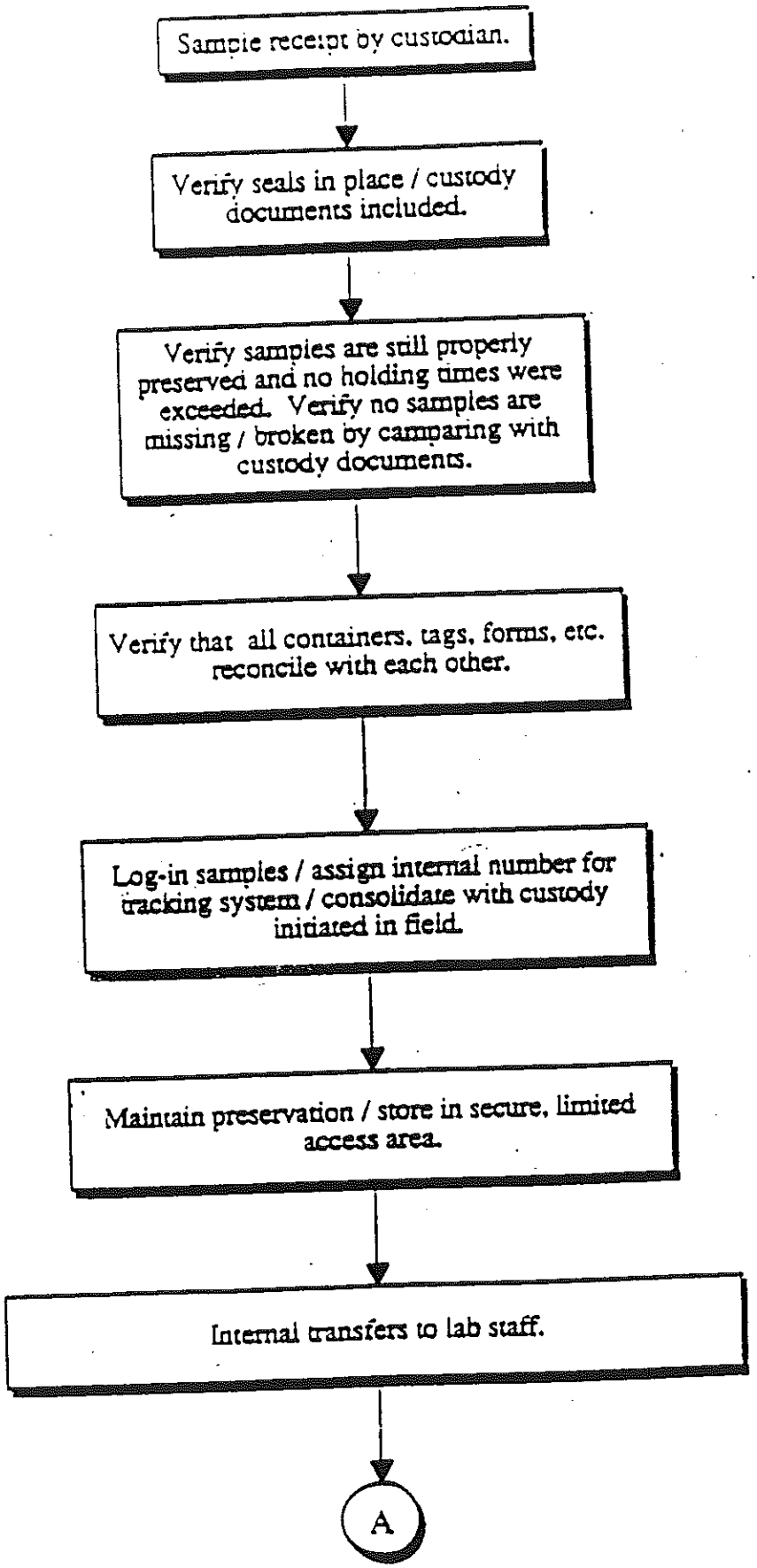
Each cooler should have 2 COC seals applied.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
OFFICIAL SEAL

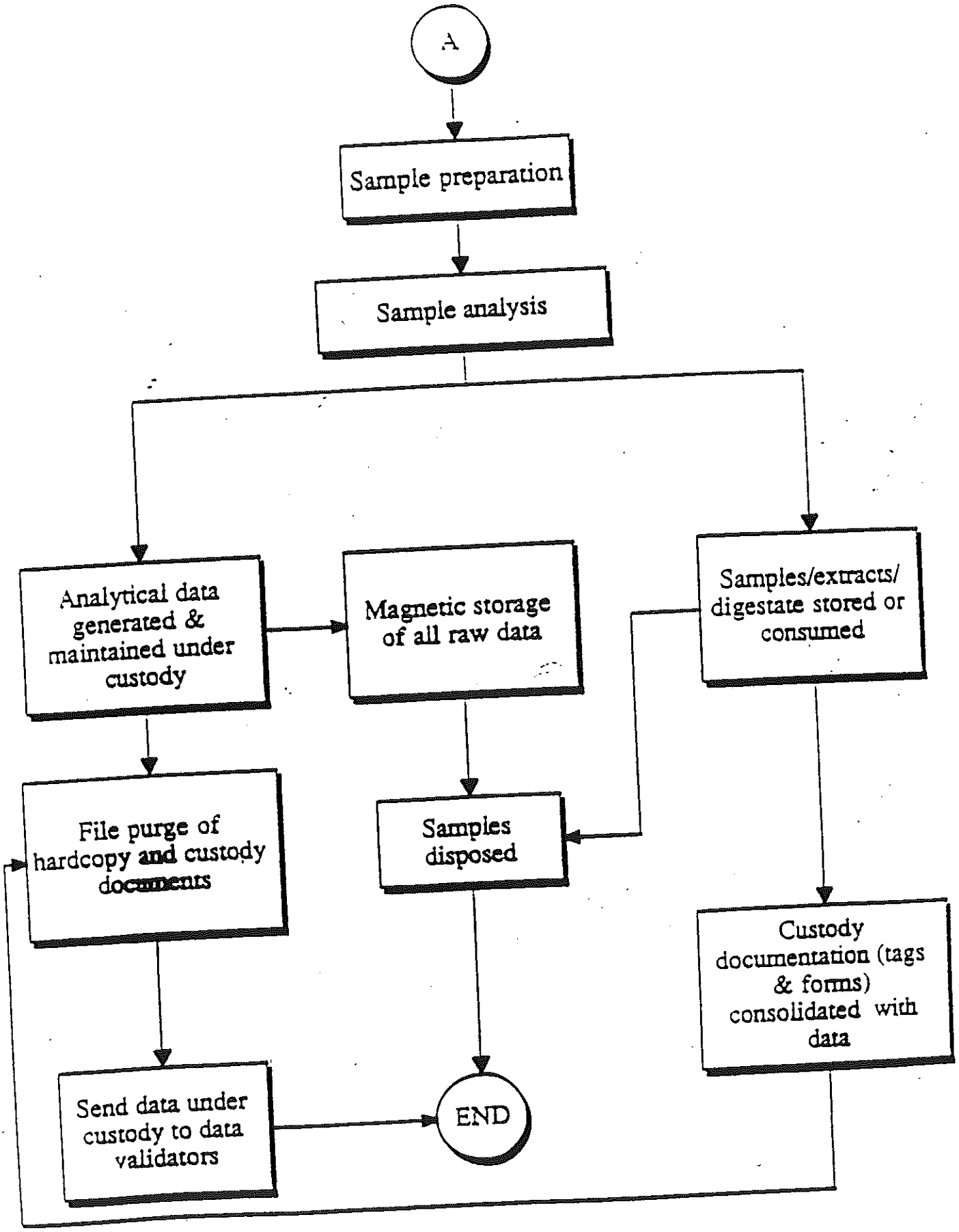
No. 13400

Chain of Custody Seal

EXAMPLE LAB CUSTODY SEQUENCE



EXAMPLE LAB CUSTODY SEQUENCE (continued)



SAMPLE TAG

1. Enter your project number for the site, which may be the first six digits of the CRL log number (see page C-21).
2. Enter the sampling station code, i.e., MW1, BLK, SS1, etc.
3. Enter date of sampling.
4. Enter time of sampling (military time only).
5. Specify "grab" or "composite" sample with an "X".
6. Insert station location. If the sample is a field blank or if to be used for the spike or duplicate analysis, notate here.
7. Obtain signature of sample team leader.
8. Indicate presence of preservative with an "X".
9. Specify analytes for analysis with an "X".
10a. Indicate traffic report number (i.e., EW846 or MEX013) for that sample if the samples are being shipped to the CLP. If the samples are going to the CRL, list the CRL log number.
10b. Indicate the case number.
11. Leave BLANK (for laboratory use only).
12. Enter any desired analyses not listed on the tag provided (e.g., PCB's, ammonia, sulfide, etc.) and mark the box with an "X".

NOTE: Each sample container should have a separate tag.
All field blanks should be designated as such on the sample tags, either in the 'Remarks' field (10a and 10b) or in the 'Station Location' field (6).

Organic Traffic Report

(For Organic CLP Analysis)

EPA — United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703 557 2490 FTS 557-2490

SAS No. (If applicable):

Case No: 1234

1. Project Code: | Account Code:

Regional Information:

Non-Superfund Program:

Site Name: Landfill

City, State: Chicago, IL | Site Spill ID: 22

2. Region No: II | Sampling Co.: Your Company

Sampler (Name): Your Name

Sampler Signature: Your Signature

3. Type of Activity: ENF [X], ER, LSI, NPLD | PA, RA, RD, STSI | O&M, RI/FS, SSI, ST, STPA, Other

4. Date Shipped: 3/1/91 | Carrier: Fed-Ex

Airbill Number: 5678901

5. Ship To: Lab Name, Address, Attn: ——

6. Preservative (Enter in Column D):
1 HCl
2 HNO_3
3 Na_2SO_4
4 H_2SO_4
5. Other (SAS) (Specify)
6 Ice only
N Not preserved

7. Sample Description (Enter in Column A):
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (SAS)
7. Waste (SAS)
8. Other (SAS) (Specify)

Triple volume required for matrix spike/matrix spike duplicate analysis sample.
Ship medium and high concentration samples in paint cans.
See reverse for additional standard instructions.
Please indicate sample to spike/duplicate

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc Low Med High	C Sample Type: Comp / Grab	D Preservative from Box 6	E RAS Analysis: VOA	BNA	Pest/ PCB	High/ ARO/ TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/ Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg Samp No.
EA1Q1	1	L	G	1	X				S-169813-14	MW-01	3/1/91 9:00		MEA01
EA1Q2	1	L	G	1	X				S-169815-16	MW02	3/1/91 10:00		MEA02
EN1Q2	1	L	G	N		X	X		S-169817-18	MW02	3/1/91 10:00		MEA03
EA1Q3	1	L	G	1	X				S-169819-20	MW-03	3/1/91 11:00		
EB1Q													

Field dups: EA1Q2

Shipment for Case complete? (Y/N): (Y)

TR COC #: 34813-34814

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Signature	3/1/91 17:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
		Received for Laboratory by:	Date / Time	Remarks: Is custody seal intact? Y/N/none	

Inorganic Traffic Report

(For Inorganic CLP Analysis)

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703 557 2490 FTS 557-2490

SAS No. (If applicable)

Case No. 12345

Project Code | Account Code

Regional Information

Non-Superfund Program

Site Name: Landfill

City, State: Chicago IL

Site Split ID: ZZ

2. Region No: V | Sampling Co.: Your Company

Sampler (Name): Your Name

Sampler Signature: Your Signature

3. Type of Activity: ENF [X], ER [ ], LSI [ ], NPLD [ ], PA [ ], RA [ ], RD [ ], ST [ ], STSI [ ], O&M [ ], RI/FS [ ], SSI [ ], STPA [ ], Other [ ]

4. Date Shipped: 3/1/91 | Carrier: FedEx

Airbill Number: 1234567

5. Ship To: Lab Name / Address / Attn:

6. Preservative (Enter in Column D): 1. HNO3, 2. NaOH, 3. HCl, 4. H_2SO_4, 5. Ice only, 6. Other (SAS) (Specify), N. Not preserved

7. Sample Description (Enter in Column A): 1. Surface Water, 2. Ground Water, 3. Leachate, 4. Rinsate, 5. Soil/Sediment, 6. Oil (SAS), 7. Waste (SAS), 8. Other (SAS) (Specify)

Double volume required for spike/duplicate analysis sample

Ship medium and high concentration samples in paint cans.

See reverse for additional standard instructions.

For total or dissolved metals, check only one RAS analysis per each sample

CLP Sample Numbers (from labels)	A Enter 8 from Box 7	B Conc. Low Med High	C Sample Type: Comp / Grab	D Preservative from Box 6	E - RAS Analysis: Metals Target	Metals Dissolved	Cyanide	Low Conc. Nutrients Ammo	Low Conc. Nutrients Fluoride	High pH	High Corrosivity Sulfide	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No.	
MEA01	1	L	G	1	X							5-169803	MW-01	3/1/91 9:00		EA101	
MEA01	1	L	G	2			X					5-169804	MW-01	3/1/91 9:00			
MEA02	1	L	G	1	X							5-169805	MW-02	3/1/91 10:00		EA102	
MEA02	1	L	G	2			X					5-169806	MW-02	3/1/91 10:00			
MEA03	1	L	G	1	X							5-169807	MW-03	3/1/91 11:00		EA103	
MEA03	1	L	G	2			X					5-169808	MW-03	3/1/91 11:00			Field dups: MEA03 MEA04
MEA04	1	L	G	1	X							5-169809	MW-03	3/1/91 12:00		EA104	
MEA04	1	L	G	2			X					5-169810	MW-03	3/1/91 12:00			
MEA05	3	L	G	1	X							5-169811	FB-01	3/1/91 13:00		EA105	Field Blank
MEA05	3	L	G	2			X					5-169812	FB-01	3/1/91 13:00			

Shipment for Case complete? (Y/N): Y

USE MEA01 for spike.
USE MEA02 for dup.

TR COC Seals 3481S - 3481Q

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Signature	3/1/91 17:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Received by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Is custody seal intact? Y/N/none

EXAMPLE FIELD CUSTODY SEQUENCE